



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/657,360

09/08/2003

Michael Y. Wen

2000.110A

9508

34477

7590

08/01/2008

Exxon Mobil Upstream
Research Company
P.O. Box 2189
(CORP-URC-SW 359)
Houston, TX 77252-2189

EXAMINER

SINGH, PREM C

ART UNIT

PAPER NUMBER

1797

MAIL DATE

DELIVERY MODE

08/01/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/657,360	Applicant(s) WEN, MICHAEL Y.	
	Examiner PREM C. SINGH	Art Unit 1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 July 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 13-41 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 13-41 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|----------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>07/17/2008</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 07/17/2008 has been entered.

IDS by the Applicant filed 07/17/2008, has been considered.

This action is being made final because no amendment to the claim(s) and no remarks after the Advisory action by the Applicant have been filed.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

1. Claims 13-18, 20, 21, 25-27 and 34-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over McKinney (US Patent 4,061,562) in view of Khan (US Patent 6,059,957) and Gomi (US Patent 3,689,401).

2. With respect to claims 13-17, 24, 36, 37 and 41, McKinney discloses a process comprising the hydrodesulfurization of a residual oil in the presence of hydrogen, passing the desulfurized oil and hydrogen containing gases to a thermal cracking step, and the thermal cracking of the residual oil in a riser reactor at temperatures of between about 1300 and 2500 degrees F for a residence time between about 0.05 to 2 seconds, where the product is immediately quenched upon leaving the riser (See McKinney, column 4, lines 26-41 and claims 1-10).

McKinney does not disclose where the heavy oil upgrading process stabilizes the quenched oil product at a temperature below 850 degrees F for 1-60 minutes to form a stabilized oil product and produces 95-wt% or greater liquid products.

However, Khan discloses upgrading heavy oil into lighter oil with a 0.97-wt% liquid product (See Khan, column 2, lines 40-42 and Table 6, where the liquid weight is 178.8 gm and the gas weight is 4.51 gm).

Khan also discloses that it is preferred for gases derived from the upgrading process to be separated and recycled back into the process (see Khan, column 6, lines 38-46).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of McKinney to include upgrading heavy oil into lighter oil with a 0.97-wt% liquid product in order to recycle the gas back into the process.

Also, Gomi discloses stabilizing products from thermal cracking by subjecting the product to temperatures between 40 and 200 degrees C for 0.1 to 2 hours (104-392 degrees C for 6-120 minutes) (See Gomi, column 3, lines 10-30). Gomi further discloses that thermally unstable substances are converted into resins when heated and can cause plugging of pipes (See Gomi, column 3, lines 54-60).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of McKinney to include stabilizing products from thermal cracking by subjecting the product to temperatures between 40 and 200 degrees C for 0.1 to 2 hours in order to prevent the products from producing resins and plugging pipes.

3. With respect to claims 18 and 40, although McKinney invention does not specifically disclose using a recycle, but it would have been obvious to modify the McKinney reference to include a product recycle because such a step is known in the art to reduce waste.

4. With respect to claims 20 and 21, McKinney in view of Khan and Gomi disclose every limitation of claim 16, but McKinney does not disclose that at least 30 percent of the total upgrading of said heavy oil occurs in the stabilization step.

However, Gomi discloses a stabilizing step following thermal cracking that is performed under the same parameters as the claimed stabilization step (See Gomi, column 3, lines 20-25 and paragraph 9, above).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of McKinney to include where at least 30 percent of the total upgrading of said heavy oil occurs in the stabilization step because both applicants invention and Gomi disclose thermal cracking followed by a stability step and the stability step of Gomi is operated under the same conditions as Gomi. Thus, the stability step of Gomi should produce similar products of the claimed invention, such as where at least 30 percent of the total upgrading of said heavy oil occurs in the stabilization step.

5. With respect to claim 25, McKinney in view of Khan and Gomi disclose all limitations of claim 16 (See paragraph 9), but McKinney does not disclose where the hydrogen containing gas is syngas produced primarily from air as an oxidizing agent, where the syngas contains hydrogen gas.

However, Khan discloses where the hydrogen containing gas is syngas produced from oxygen as the oxidizing agent, where the syngas contains hydrogen gas (See Khan, column 2, lines 5-7 and column 4, lines 4-8).

Khan also discloses that syngas is obtained by a reaction in the process and is used to supply hydrogen to the reaction and that hydrogen not generated in the refinery must be preheated (See Khan, column 1, lines 57-67 and column 3, lines 59-65).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of McKinney to include where the hydrogen containing gas is syngas produced from oxygen as the oxidizing agent, where the syngas contains hydrogen gas in order to avoid preheating the hydrogen.

6. With respect to claims 26 and 27, although McKinney invention does not specifically disclose the system pressure and hydrogen partial pressure in the process, but it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of McKinney to include pressures within the claimed range in order to achieve desired results. See MPEP 2144.05 II. A.

7. With respect to claims 34 and 35, McKinney in view of Khan and Gomi disclose every limitation of claim 16 (See paragraph 9), but McKinney in view of Gomi and Khan do not disclose where the reaction severity index of the stabilizing step is below 200 seconds.

However, Gomi discloses a stabilizing step following thermal cracking that is performed under the same parameters as the claimed stabilization step (See Gomi, column 3, lines 20-25 and paragraph 9, above).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of McKinney in view of Khan and Gomi to include where the reaction severity index of the stabilizing step is below 200 seconds because both applicants invention and Gomi disclose thermal cracking followed by a stability step and the stability step of Gomi is operated under the same conditions as Gomi. Thus, the stability step of Gomi should be performed under similar conditions as Gomi, which would mean that the reaction severity index of the stabilizing step should necessarily be below 200 seconds.

8. With respect to claims 38 and 39, McKinney discloses where the cracking process is a thermal cracking process that includes where the feed contacts hot solids in the amount of at least 1 weight percent of the feed (See McKinney, column 5, lines 1-5 and claim 1).

9. Claims 22, 23, 32, and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over McKinney in view of Khan and Gomi as applied to claim 16 above, and further in view of Gregoli (US 6016868).

10. With respect to claims 22 and 23, McKinney in view of Khan and Gomi disclose every limitation of claim 16 (See paragraph 9), but do not disclose where the process produces less than 1 wt% of C₁ to C₄ hydrocarbons.

However, Gregoli discloses a product containing 1.12 wt% of C₁-C₄ hydrocarbons (See Gregoli, column 26, Table 10 and MPEP §2144.05).

Gregoli discloses that the hydrocarbon gases are removed from the processed oil before the product oil is obtained (See Gregoli, column 13, lines 1-30).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of McKinney in view of Khan and Gomi to include a product containing 1.12 wt% of C₁-C₄ hydrocarbons because most of the C₁-C₄ hydrocarbons are removed from the product oil as a gas.

11. With respect to claims 32 and 33, McKinney in view of Khan and Gomi disclose every limitation of claim 16 (See paragraph 9), but do not disclose where the process produces 1050 degrees F conversion of greater than 35-wt%.

However, Gregoli discloses a process that produces a 975 degree F conversion of 50% (See Gregoli, column 22, Table 6 and MPEP §2144.05).

Gregoli also discloses that increased hydrogen improves product quality (see Gregoli, column 23, lines 26-28).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of McKinney in view of Khan and Gomi to include a process that produces a 975 degree F conversion of 50% so that the product produced is of an improved quality.

12. Claims 19 and 29-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over McKinney in view of Khan and Gomi as applied to claim 16 above, and further in view of Benham (US 6004453).

13. With respect to claim 19, McKinney in view of Khan and Gomi disclose everything in claim 18 (see paragraph 9), but do not disclose where the total mass flow rate of feed oil provided to the thermal cracking step is at least 10 times greater than the first flow rate of the fresh feed stream.

However, Benham discloses that the product yields of distillate increase as the % of gas recycle increases (See Benham, Figure 7).

Benham discloses that recycling heavy gas oil to the reactor allows for increased reaction temperatures without coke formation (See Benham, column 5, lines 20-25).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of McKinney in view of Khan and Gomi to include where the thermal cracking step is at least 10 times greater than the first flow rate of the fresh feed stream because product yields improve as the recycle rate increases and recycling heavy gas oil to the reactor allows for increased reaction temperatures without coke formation.

14. With respect to claims 29-31, McKinney in view of Khan and Gomi disclose every limitation of claim 16 (See paragraph 9), but do not disclose where the process produces less than 0.1 wt% of coke on a fresh feed oil basis.

However, Benham discloses a process that produces no coke (See Benham, column 4, lines 36-41).

Benham also discloses that coke formation can create a problem of limiting reactor temperatures (See Benham, column 5, lines 1-9).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of McKinney in view of Khan and Gomi to include a process that produces no coke in order to prevent reactor temperatures from being limited.

15. Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over McKinney in view of Khan and Gomi as applied to claim 27 above, and further in view of Fuderer (US Patent 4,822,521). McKinney in view of Khan and Gomi disclose every limitation of claim 27, but do not disclose where the steam to hydrocarbon ratio used to produce syngas is from 0.5:1 to 2.0:1.

However, Fuderer discloses producing synthesis gas with a steam to hydrocarbon ratio of 2:1 (See Fuderer, column 2, lines 13-15 and column 1, lines 26-29).

Fuderer also discloses that conventional steam reforming is conducted with a steam to hydrocarbon ratio of 2:1 (See Fuderer, column 1, lines 26-29).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of McKinney in view of Khan and Gomi to include producing synthesis gas with a steam to hydrocarbon ratio of 2:1 because it is conventional to use such a ratio in steam reforming.

Conclusion

16. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to PREM C. SINGH whose telephone number is (571)272-6381. The examiner can normally be reached on 7:30 AM to 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on 571-272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1797

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

PS 072408

/Glenn A Caldarola/
Acting SPE of Art Unit 1797